WARE LIND FURLOW ENGINEERS, INC.
GEOTECHNICAL AND EARTH SCIENCE CONSULTANTS

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April 20, 1992

Mississippi Office of Pollution Control
Post Office Box 10385
Jackson, Mississippi 39289-0385

Report No. 92025

Attention: Mr. Steve Spangler

Groundwater Assessment
Enterprise Recovery Systems
Cayce, Mississippi

Gentlemen:

Submitted herein is the report of our groundwater assessment of the Enterprise Recovery Systems facility located in Cayce, Mississippi. This study was requested by the Mississippi Office of Pollution Control on December 23, 1991.

The scope of work for this investigation was outlined in our proposal dated February 3, 1992. Details of the investigation are provided in the body of this report.

We appreciate the opportunity of providing services to you on this project. If we can furnish any additional information or further assist you in any way, please call on us.

Very truly yours,

WARE LIND FURLOW ENGINEERS, INC.

Ronald J. Tarbutton, P. G.

Charles R. Furlow, P. E.

RJT/CRF/tls
Copies Submitted: (4)

groundwater levels. Water used by WLFE during the field investigation phase of this study was obtained from fire hydrants from the cities of Byhalia, Mississippi and Collierville, Tennessee.

Relatively undisturbed samples of cohesive soils encountered in the soil borings were obtained by pushing a 3-in. OD thin-wall Shelby tube sampler a distance of approximately 2 ft into the soil using hydraulic cylinders on the drill rig (ASTM D 1587). The depths at which these samples were obtained are indicated by shaded portions in the "Samples" column of the boring logs. The undisturbed samples were removed from the Shelby tube in the field using a hydraulic extruder mounted on the drill rig. Each sample was extruded into an aluminum foil-lined sample catcher. The upper and lower 2 in. of soil samples were trimmed and discarded. In granular materials, representative soil samples will be obtained by driving a standard 2-in. OD split-spoon sampler a distance of 18 in. into the soil with a 140-lb hammer falling a distance of 30 in. The number of blows required to drive the sampler the final 12 in. of penetration was observed and recorded (ASTM D 1586). Representative portions of the soil samples were placed in glass jars for future reference. A representative portion of each sample was placed in a foil-covered glass jar for field screening analyses. The lithologic descriptions of the soil samples were made by a qualified geologist. Soil classification was performed in general agreement with ASTM Standard Test Methods D 2487 and D 2488. The soils were characterized by strength, plasticity, color and particle size. Each sample was identified by boring number, sample depth and sample number.

To prevent cross contamination between borings, the drilling and sampling equipment was decontaminated between samples and between boring locations. Equipment included in the decontamination process were soil samplers, augers and drill rods. The decontamination procedure consisted of cleaning the equipment with a steam cleaner and thoroughly washing with a non-phosphate detergent. The equipment was then rinsed with tap water, deionized water and double rinsed with pesticide grade isopropanol alcohol. The decontamination procedures for the soil sampling equipment consisted of thoroughly washing the equipment with a non-phosphate detergent and rinsing with tap water. The equipment was allowed to air-dry before utilization.

Field screening was used to determine if volatile organic compounds were present. Soil samples were allowed to equilibrate to ambient temperatures for a period of approximately 10 minutes. After the sample equilibrated to ambient

temperature, the headspace of the glass jar was sampled using a HNu photoionization detector (PID). The PID readings are presented in the right-hand column of the graphical boring logs. The instrument was periodically adjusted during the day to compensate for instrument drift and ambient concentrations of petroleum hydrocarbons in the air, if any.

A temporary benchmark with an assumed elevation of 100 ft NGVD was established at the corner of a sidewalk near the office building located on the site. Relative elevations of existing borings and groundwater levels were referenced to this temporary benchmark. The observed water levels for the borings are noted at the bottom right of the graphical logs. A table indicating the relative top of casing elevations, water levels and water elevations is shown on Plate 22. A potentiometric map of the groundwater surface was constructed from water level observations made on April 10, 1992. This potentiometric map is presented on Plate 23.

The field investigation also included the installation of seven groundwater monitoring wells. Five of these wells (MW-1 through MW-4 and MW-6) were installed to a total depth of 110 ft; and two wells (MW-7 and MW-8) were installed to at total depths of 77 ft and 76.5 ft, respectively. Monitor Well MW-5 was installed by E.F. Williams and Associates located in Memphis, Tennessee. The locations of the monitoring wells were selected by a representative of MDEQ. The general location of the monitor wells are shown on Plate 1. The monitor wells were installed to provide hydrological data and a means of groundwater sampling. Monitor well construction details are presented on Plates 24 through 30. Water well drillers logs were submitted to MDEQ Office of Land and Water Resources. Copies of the well drillers logs are presented on Plates 31 through 34.

The groundwater monitoring wells installed consist of 2-in. diameter Triloc Schedule 40 PVC as manufactured by Brainard-Kilman. The well screens are 10 ft in length and have No. 10 slot sizes. At two of the monitor well locations (MW-7 and MW-8), a portion of each screen was placed above the groundwater level to allow monitoring of phase product, if any. The screens were installed to provide at least 5 ft of well screen below the observed groundwater surface. After the well materials were installed in the borings, a silica sand was placed around the well screens. The filter sand extended approximately 3 ft above the top of the screens. A 2 ft thickness of bentonite pellets was placed in the annular space between the boring sidewall and riser pipe to provide a seal. The

pellets were wetted and allowed to hydrate for approximately one hour. A cement-bentonite grout was placed from the top of the bentonite seal to the surface. Above-ground metal shrouds with locking lids were installed over the monitor wells. The shrouds were installed in 4 ft by 4 ft concrete pads to prevent surface water from entering the annular space. At the existing monitor well, a flush mount was installed in a 4 ft by 4 ft concrete pad to prevent surface water from entering the annular space.

Boring B-4 was advanced using rotary wash drilling techniques to a terminal depth of 114 ft. Based on the information provided from the field screening analyses, a 6-in. diameter surface casing was installed to a terminal depth of 80 ft. Prior to installing the surface casing, the boring was enlarged to 10-in. in diameter and completely filled with a cement-bentonite grout mixture. The grout was placed into the boring from the bottom to the surface using the tremie method. Subsequent to grouting the boring, the 6-in. diameter surface casing was installed and advanced into the underlying soils using the hydraulics on the drill rig. The grout was allowed to harden for approximately 24 hours before advancing the boring. Prior to advancing the soil boring, the pump system on the drill rig was decontaminated by circulating a nonphosphate detergent for approximately 30 minutes. Drill fluids and soil cuttings were removed from the mud pit and the pit flushed with fresh water. Boring B-4 was then advanced to a terminal depth of approximately 114 ft.

The groundwater monitor wells were purged before taking samples in order to clear any stagnant water from the well casing. Approximately three well volumes of groundwater were removed from the monitor wells before the samples were taken. The groundwater samples were placed in 40-mil glass vials (volatiles). The water was placed in the containers taking care not to agitate the samples to limit the volatilization and amount of oxygen added. The head space of the samples bottles was eliminated by completely filling the bottles. The bottles were then placed upside down in a container with ice and kept at 4°C. The water samples were delivered to the Mississippi State Health Department (MSHD) laboratory located in Jackson, Mississippi for analytical testing. All groundwater samples were identified with a label. The information provide on the label consisted of the project name, project number, monitor well number, type of test to be performed and date collected. A chain-of-custody seal was placed across the lid of each sample bottle.

For this investigation, three types of sample blanks were used. The sample blanks included trip blanks, equipment rinseate blanks and a Collierville City water blank. The trip blanks were prepared at the laboratory by filling the appropriate containers with deionized water. The trip blanks were transported from the laboratory to the field and back to the laboratory in a manner identical to the handling procedures used for the soil and water samples. The trip blanks were subjected to the same analytical tests as the water samples. In order to verify the effective decontamination of the sampling equipment, an equipment rinseate sample was collected. The rinseate sample was obtained by pouring purged deionized water over the sampling equipment. The resultant rinseate solution was collected in a decontaminated pyrex dish and placed in the appropriate containers for subsequent laboratory analyses. The purged deionized water was obtained from the MSHD laboratory. The City of Collierville water sample was obtained by filling bottles from WLFE equipment used to transport water obtained from the Collierville Water System. All water samples were collected in 40 mm vials supplied by the MSHD laboratory.

A chain-of-custody/analyses request form accompanied all samples delivered to the analytical laboratory. The chain-of-custody forms document sample possession from the time the samples were collected until analysis, in accordance with Federal and State guidelines. To maintain a permanent document of sample possession, the chain-of-custody documentation contained the following information: name and address of the sampling location, sample number, date and time of collection and sample type. Other pertinent information included identification of the boring, well number, number of sample containers, parameters requested for analyses, signature of the person(s) involved in the chain-of-possession and inclusive dates of possession. A seal was placed across the lid of each water sample bottle taken at the facility and had the signature of the person collecting the sample and the date. Copies of the chain-of-custody/analyses request forms are presented in the Appendix. The samples were delivered to the MSHD laboratory for analysis.

GENERAL SOIL CONDITIONS AND HYDROGEOLOGY

Physiographically, the site is located in the north central hills physiographic province. The geologic units encountered at the site from the youngest to the oldest are the Holocene Age Alluvial Sediments associated with

the Nonconnah River and the Eocene Kosciusko Formation. A generalized soil profile illustrating the stratigraphic relationship of the formations is presented on Plate 35.

The sediments associated with the Nonconnah River alluvium vary from clays and silty clays to sandy clays. The alluvium ranges in thickness from a minimum of 12 ft at Boring 5 to a maximum of 17 ft at Boring 2.

The Kosciusko Formation is characterized by dense white, brown and red, very fine to coarse grained sands with some reworked clays. Based on available geologic literature, the Kosciusko Formation is approximately 100 ft thick beneath the facility. The potentiometric map of the groundwater surface presented on Plate 23 was constructed from water level observations made on April 10, 1992. This potentiometric map indicates the direction of shallow groundwater flow is to the west-northwest.

Based on the review of the geologic literature, the site of this investigation is within a recharge area for the Kosciusko Aquifer. A potentiometric surface map of the Kosciusko Aquifer in the study area (Gandl, 1982) indicates a general groundwater flow for that aquifer to the west. The Kosciusko Formation is directly recharged from rainfall and streams.

REPORT LIMITATIONS

The borings made for this report were located in the field based on the direction of MDEQ, MOPC. The boring logs shown in this report contain information related to the types of soil encountered at specific locations and times and show lines delineating the interface between these materials. The logs also contain our field representative's interpretation of conditions that are believed to exist in those depth intervals between the actual samples taken. Therefore, these boring logs contain both factual and interpretative information. It is not warranted that these logs are representative of subsurface conditions at other locations and times.

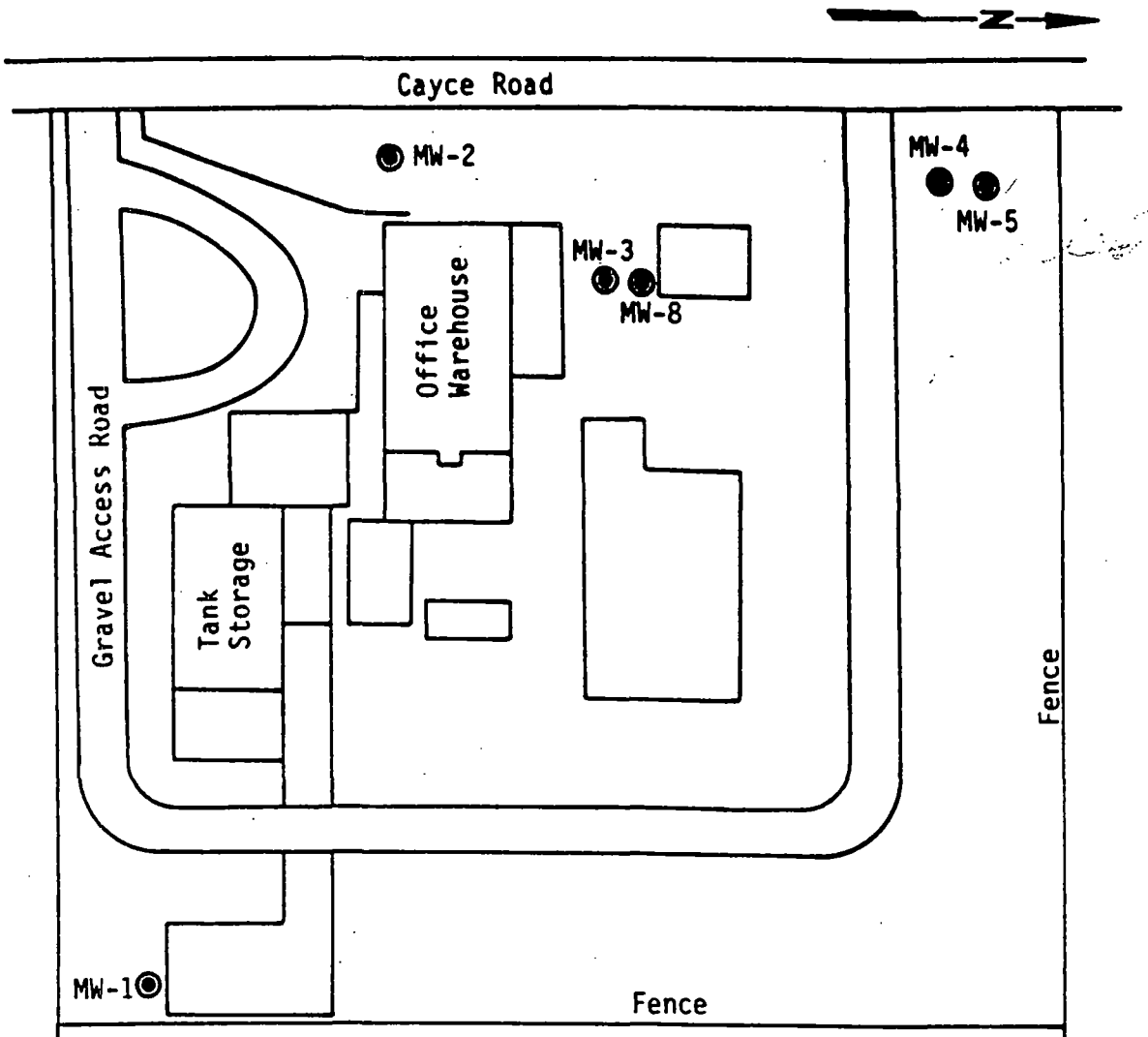
With regard to groundwater conditions, this report presents data on groundwater levels as they were observed during the course of the field work. In particular, water level observations have been accomplished at the times and under conditions stated in the text of the report and on illustrations contained in the report. It should be noted that fluctuations in the level of the

groundwater table will occur with passage of time due to variations in rainfall, temperature and other factors.

This report presents data concerning the presence of organic vapors as measured within the headspace of selected soil samples. These data are dependent upon ambient conditions and can be expected to fluctuate. Additionally, the presence of organic vapors can fluctuate over time.

This report has been prepared for the exclusive use of Mississippi Department of Environmental Quality for specific application to the environmental assessment of the Enterprise Recovery Systems site located near Cayce, Mississippi. The only warranty made by us in connection with the services provided is that we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, expressed or implied, is made or intended.

ILLUSTRATIONS



MONITOR WELL LOCATIONS

Approximate Scale: 1 in. = 50 ft

◉ MW-7

◉ MW-6

Note: MW-5 installed by E.F. Williams & Assoc.

LOG OF BORING NO. 1
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MARSHALL COUNTY, MISSISSIPPI

TYPE: Rotary Wash

LOCATION: See Plate 1

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)	PID, PPM
0			Firm light gray silty clay with iron nodules				
5			-stiff and tan below 6'				1.6
10							3.6
15			-silty sand, carbonaceous below 13'				5
20			Medium dense tan fine to medium sand	42			9.2
25			-clay layers below 23'	25			12.5
30			-red and fine below 28'	63			34
35			-stiff light gray silty clay layers below 33'	42			62
40				20			19
45			-white fine sand below 44'	51			72
50			-fine to medium sand below 48'	100			40

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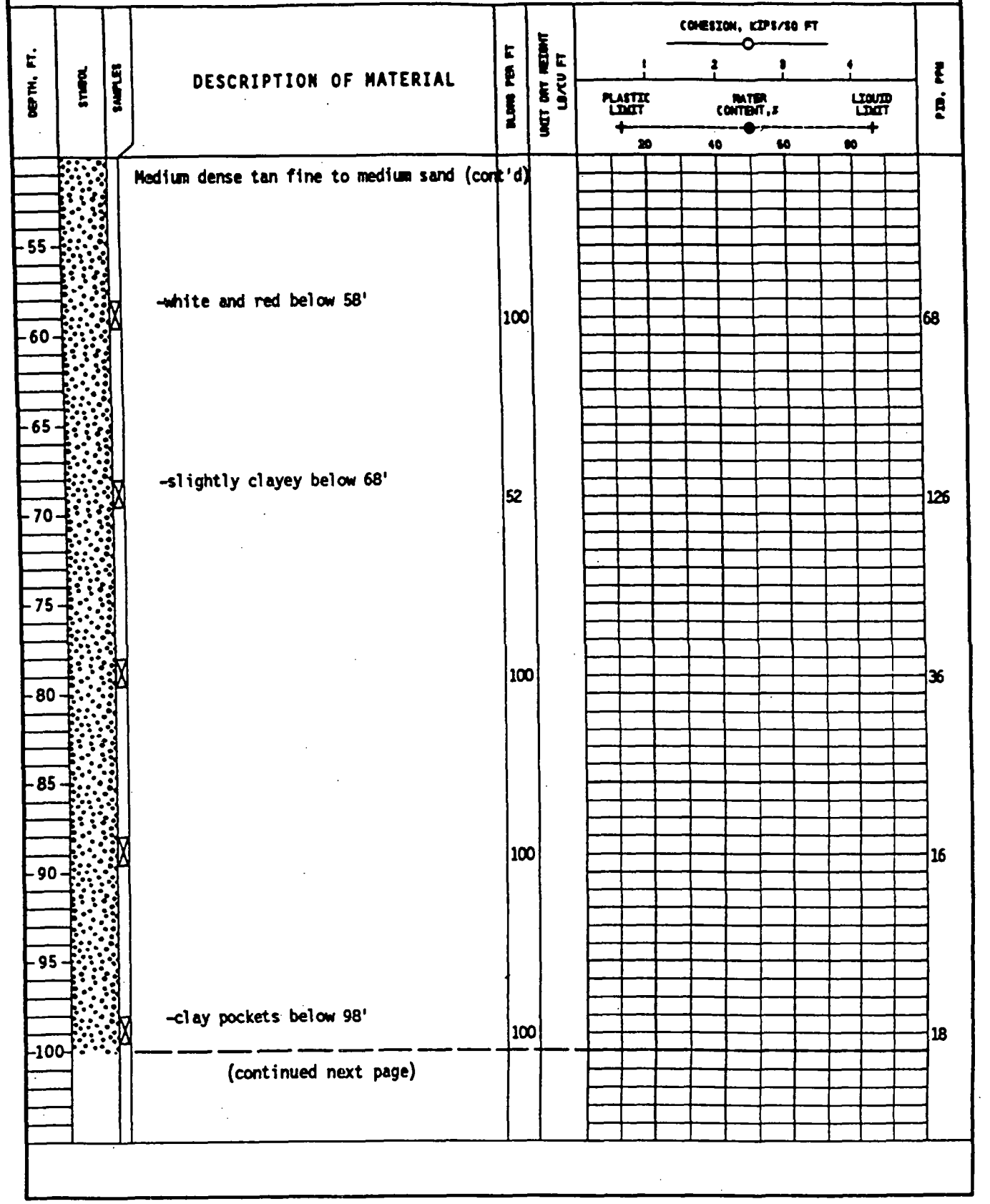
PLATE 2

LOG OF BORING NO. 1
(Continued)



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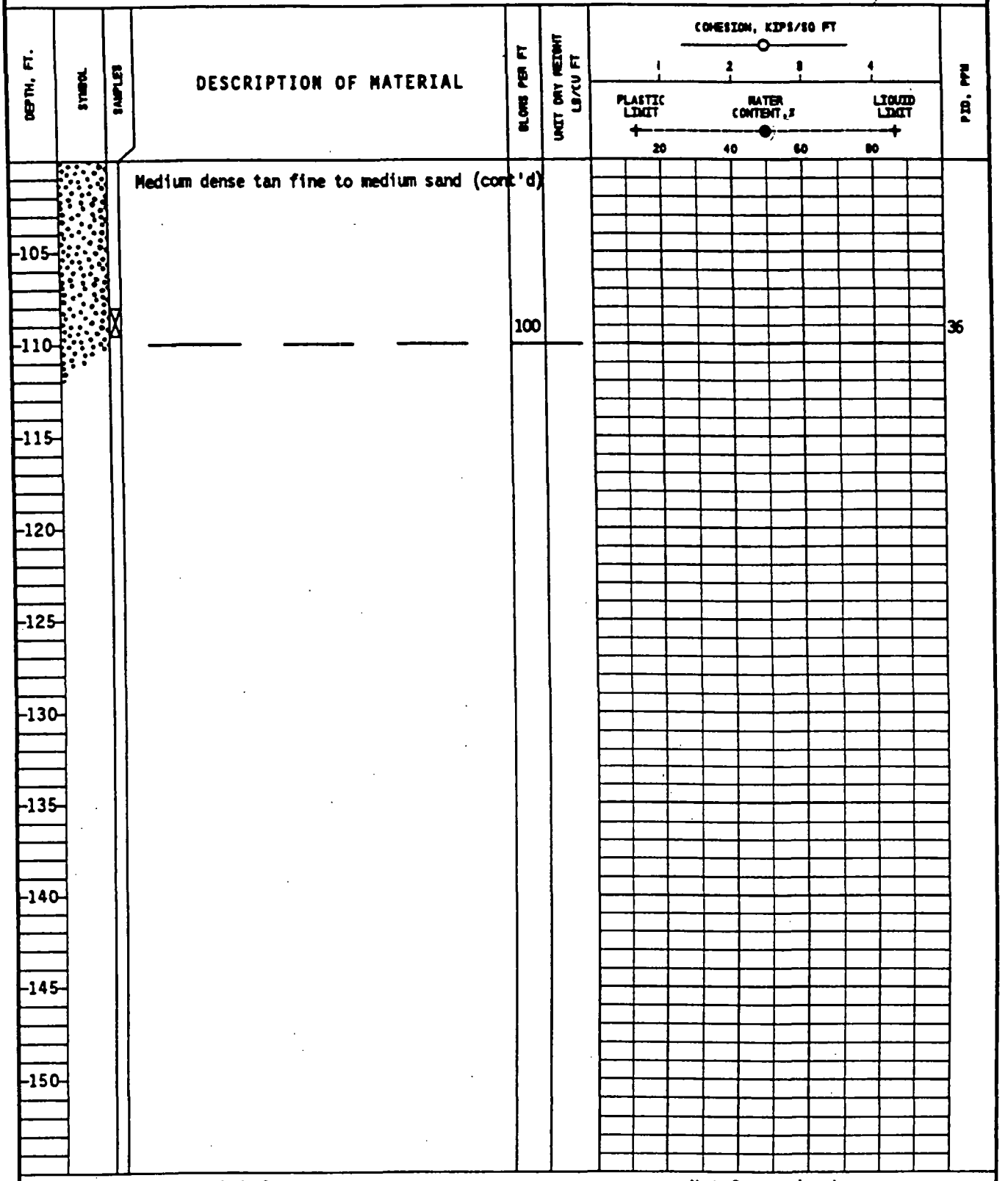
ENGINEERS

PLATE 3

LOG OF BORING NO. 1
(Continued)



COMPLETION DEPTH: 110.0 ft
DATE: 3/4/92

DEPTH TO WATER IN BORING: Not Determined

LOG OF BORING NO. 2
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MARSHALL COUNTY, MISSISSIPPI

TYPE: Rotary Wash

LOCATION: See Plate 1

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)	P.I.D. PPM
5			Firm tan and light gray silty clay				3.6
10			-tan below 8'				3.2
15			-sand with carbonaceous fragments below 13'				9
20			Medium dense white and tan very fine to fine sand with red layers of clayey sand	26			14
25			-red, slightly clayey below 23'	48			36
30			-alternating seams of light gray fine sand and clay below 28'	39			20
			Firm light gray clay				
35			Medium dense red very fine to medium sand with seams of white sand and light gray clay	100			24
40			-tan and white below 38'	100			78
45				100			52
50				100			34

(continued next page)

LOG OF BORING NO. 2
(Continued)

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)	PID, PPM
55			Medium dense red very fine to medium sand with seams of white sand and light gray clay (cont'd)				
60			-white below 58' -seam of iron oxide 59.5'-60'	100			46
65							
70			-tan below 68'	100			80
75							
80				100			39
85							
90				100			28
95							
100				100			26*
			(continued next page)				

LOG OF BORING NO. 2
(Continued)

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1 2 3 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20 40 60 80)	PID, PPM
105			Medium dense red very fine to medium sand with seams of white sand and light gray clay (cont'd)				
			-red and white below 108'				
110				100			22
115							
120							
125							
130							
135							
140							
145							
150							

COMPLETION DEPTH: 110.0 ft
DATE: 3/7/92

DEPTH TO WATER IN BORING: Not Determined

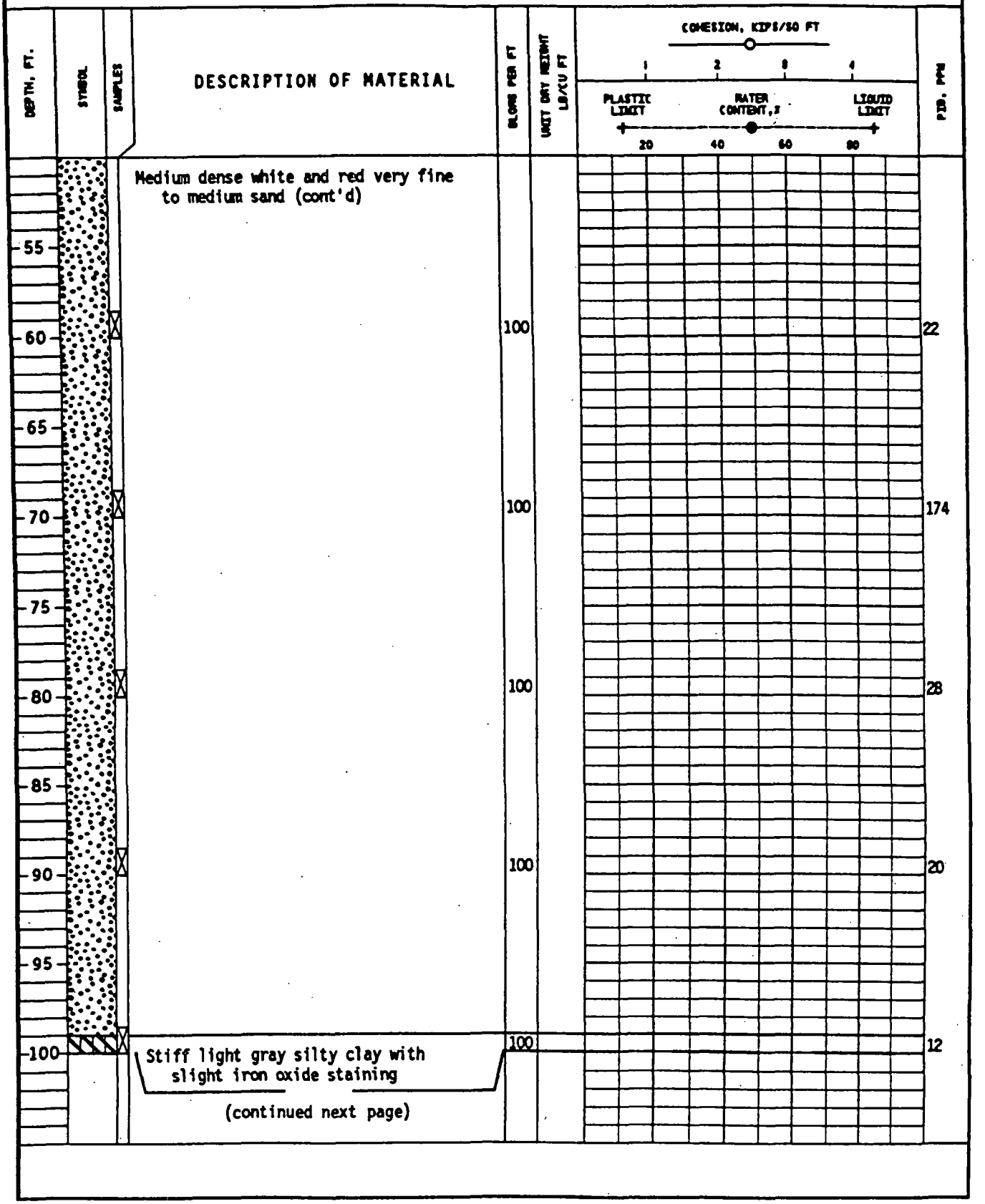
LOG OF BORING NO. 3
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MARSHALL COUNTY, MISSISSIPPI

TYPE: Rotary Wash

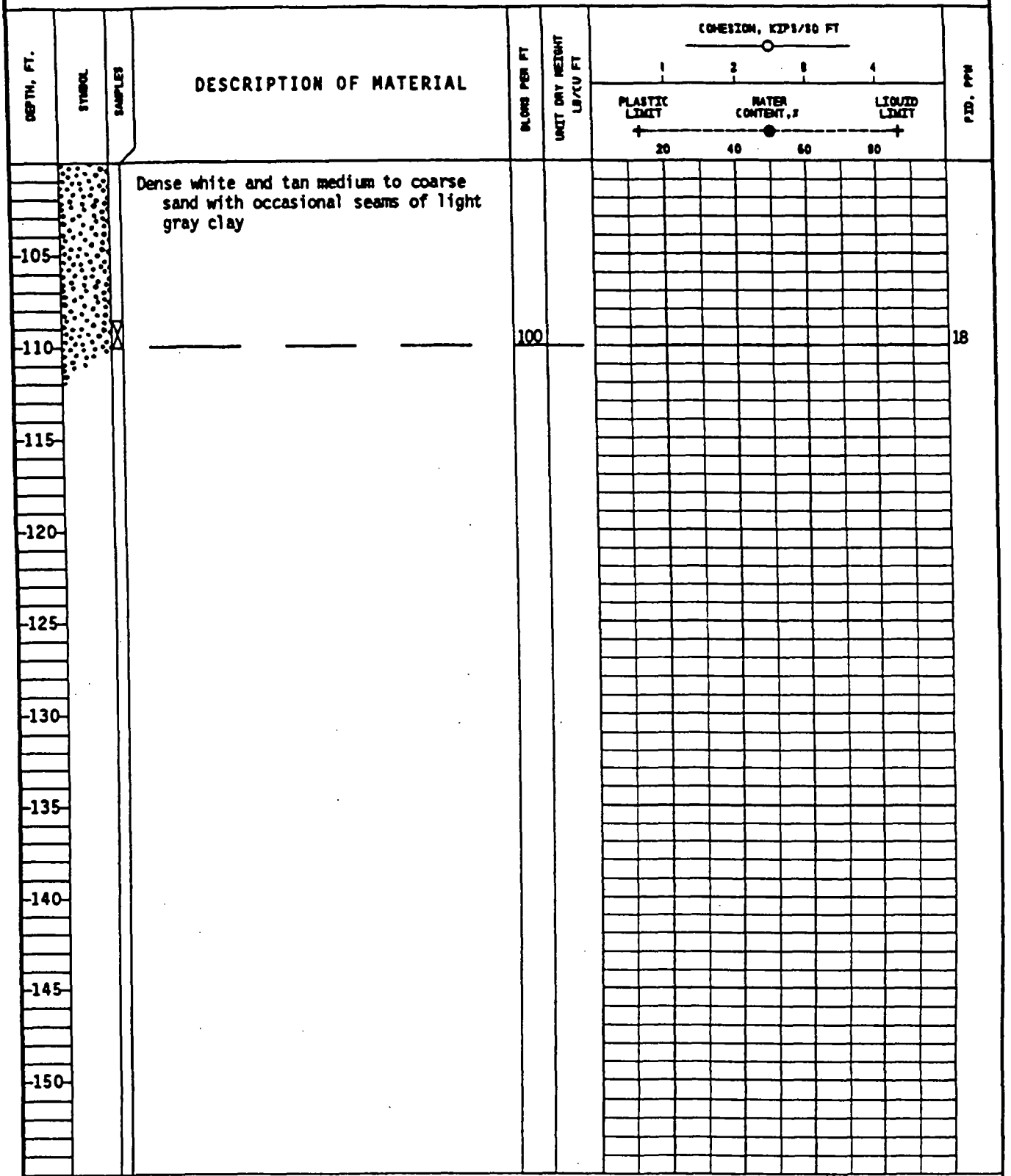
LOCATION: See Plate 1

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)	PID, PPM
5			Stiff tan silty clay with iron oxide nodules, slickensided				22
10							34
15			-red, slightly sandy below 13'				110
20			Medium dense white and red very fine to medium sand	19			28
25			-slightly clayey 23'-25'	34			28
30			-dense tan and white very fine to fine below 28'	63			20
35				100			44
40				100			36
45				100			60
50				100			20
			(continued next page)				

LOG OF BORING NO. 3
(Continued)



LOG OF BORING NO. 3
(Continued)



COMPLETION DEPTH: 110.0 ft
DATE: 3/7/92

DEPTH TO WATER IN BORING: Not Determined

LOG OF BORING NO. 4
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MARSHALL COUNTY, MISSISSIPPI

TYPE: Rotary Wash

LOCATION: See Plate 1

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)	PID, PPM
5			Stiff light gray and red clay, slightly silty				16
10							24
15							66
20			Medium dense red fine to medium sand, slightly clayey	32			11.5
25			Dense red fine to medium clayey sand	17			16
30				18			32
35			Medium dense red and white very fine to fine sand	100			13.8
40				100			15.2
45				100			13.8
50				100			10.5

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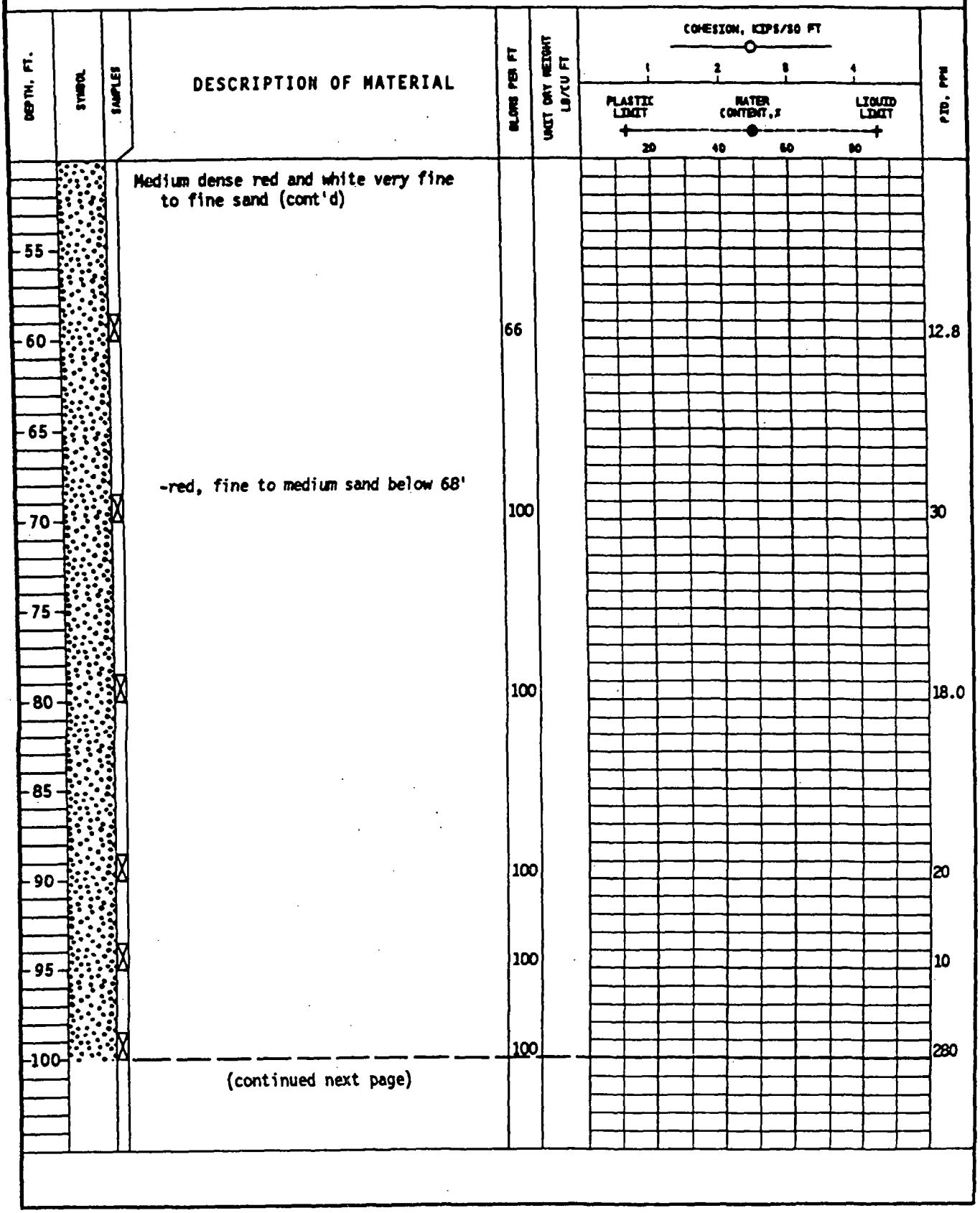
PLATE 11

LOG OF BORING NO. 4
(Continued)



LOG OF BORING NO. 4
(Continued)

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)	PID, PPM
105			Medium dense red and white very fine to fine sand (cont'd)				
110				84			24
115							
120							
125							
130							
135							
140							
145							
150							

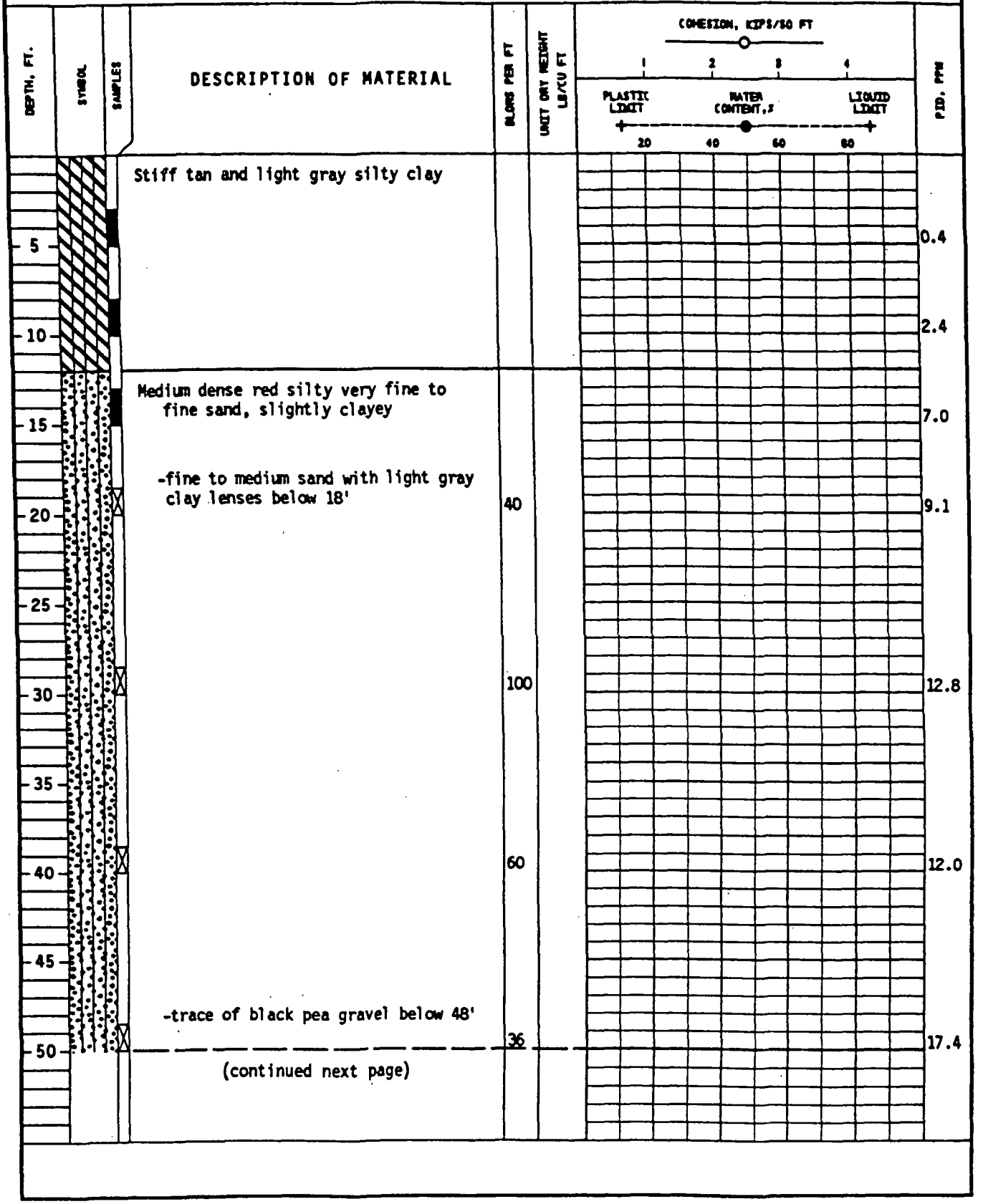
COMPLETION DEPTH: 110.0 ft
DATE: 3/9/92

DEPTH TO WATER IN BORING: Not Determined

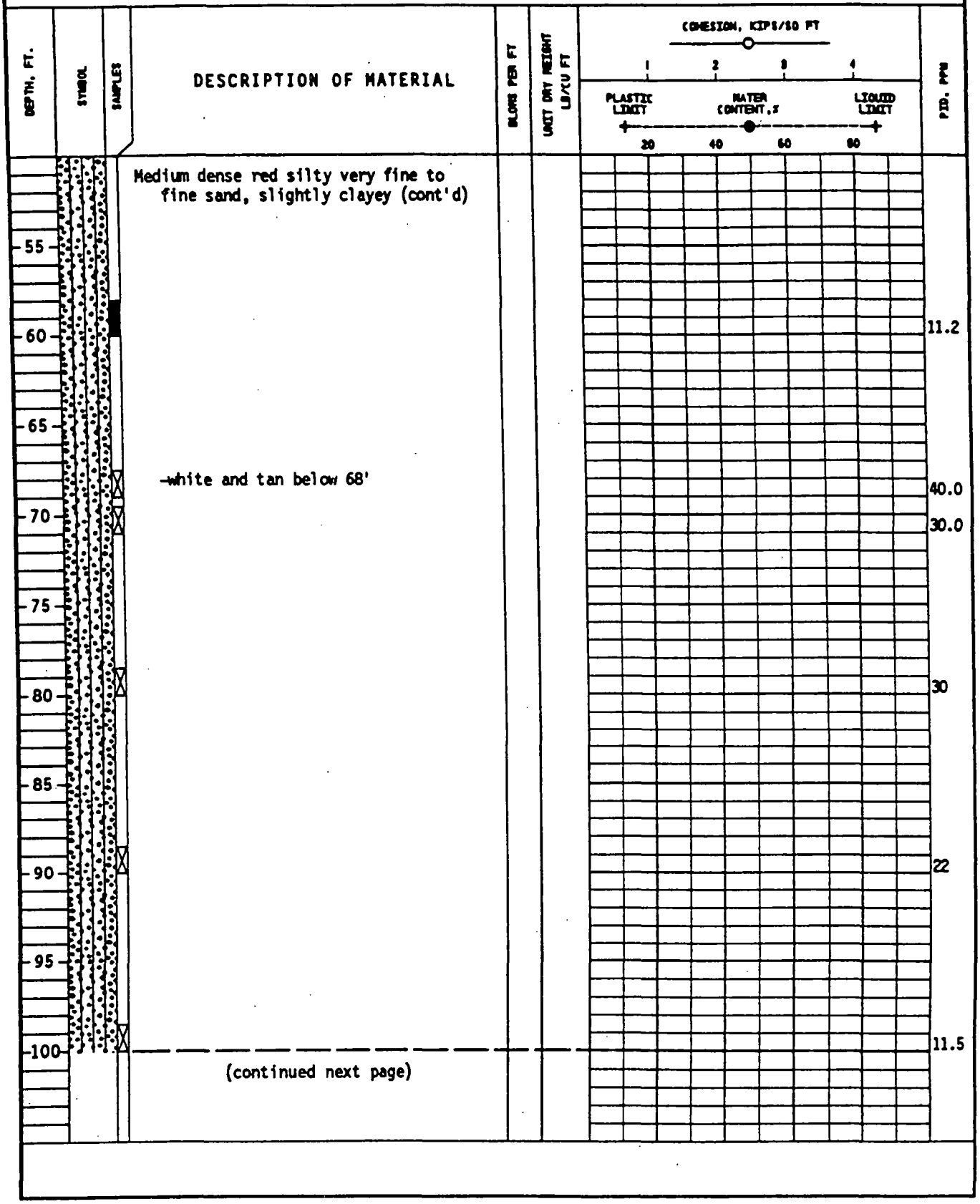
LOG OF BORING NO. 5
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MARSHALL COUNTY, MISSISSIPPI

TYPE: Rotary Wash

LOCATION: See Plate 1



LOG OF BORING NO. 5
(Continued)



LOG OF BORING NO. 5
(Continued)

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1 2 3 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20 40 60 80)	PID, PPM
105			Medium dense red silty very fine to fine sand, slightly clayey (cont'd)				
110							7.2
115							
120							
125							
130							
135							
140							
145							
150							

COMPLETION DEPTH: 110.0 ft
DATE: 4/7/92

LOG OF BORING NO. 6
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MARSHALL COUNTY, MISSISSIPPI

TYPE: Rotary Wash

LOCATION: See Plate 1

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
0			Stiff tan and light gray silty clay		
5					
10					
15			Medium dense red silty very fine to fine sand, slightly clayey		
20			-fine to medium sand with light gray clay lenses below 18'		
25					
30					
35					
40					
45			-trace of black pea gravel below 48'		
50			(continued next page)		

LOG OF BORING NO. 6
(Continued)

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
55			Medium dense red silty very fine to fine sand, slightly clayey (cont'd)		
60					
65			-white and tan below 68'		
70					
75					
80					
85					
90					
95					
100					

COMPLETION DEPTH: 80.0 ft
DATE: 4/7/92

LOG OF BORING NO. 7
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MARSHALL COUNTY, MISSISSIPPI

TYPE: Rotary Wash

LOCATION: See Plate 1

DEPTH, FT.	SYMBOL	SAMPLER	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
0			Stiff tan silty clay with iron oxide nodules, slickensided		
5					
10			-red, slightly sandy below 13'		
15					
20			Medium dense white and red very fine to medium sand		
25			-slightly clayey 23'-25'		
30			-dense tan and white very fine to fine below 28'		
35					
40					
45					
50					

(continued next page)

LOG OF BORING NO. 7
(Continued)

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT LB/CU FT	COHESION, KIPS/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
55			Medium dense white and red very fine to medium sand (cont'd)		
60					
65					
70					
75					
80					
85					
90					
95					
100					

COMPLETION DEPTH: 77.0 ft
DATE: 4/9/92

DEPTH TO WATER IN BORING: Not Determined

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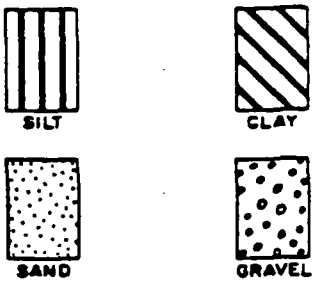
PLATE 20

SYMBOLS AND TERMS USED ON BORING LOGS

SYMBOL DESCRIPTIONS

SOIL TYPES
(SHOWN IN SYMBOL COLUMN)



(PREDOMINANT TYPE SHOWN HEAVY)

GROUNDWATER INFORMATION
(SHOWN IN SYMBOL COLUMN)

- Depth where groundwater was initially encountered
- Water level in boring approximately 15 minutes after initial encounter
- Water level in boring at least 10 hours after rotary washing

SAMPLER TYPES
(SHOWN IN SAMPLES COLUMN)

- AUGER
- SHELBY TUBE
- SPLIT SPOON
- PISTON
- NO RECOVERY

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (more than 50% retained on No. 200 sieve): Includes clean gravels and sands, and silty or clayey gravels and sands. Condition is rated according to Standard Penetration Resistance. (ASTM D1586)

DESCRIPTIVE TERM	STANDARD PENETRATION RESISTANCE (BLOWS / FT)
Very Loose	0 to 4
Loose	5 to 9
Medium Dense	10 to 29
Dense	30 to 50
Very Dense	Above 50

FINE GRAINED SOILS (50% or more passes the No. 200 sieve): Includes (1) inorganic and organic silts and clays, (2) gravely, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength as indicated by field or laboratory tests.

DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (KIPS / SQ FT)
Very Soft	Below 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very Stiff	2.00 to 4.00
Hard	Above 4.00

TERMS DESCRIBING SOIL STRUCTURE

SLICKENSIDED - having fracture planes that appear polished and glossy
FISSURED - having definite planes of fracture with little resistance to fracturing
LAMINATED - composed of thin seams of varying color and texture
STRATIFIED - composed of alternating layers of varying material or color
CALCAREOUS - containing appreciable quantities of calcium carbonate
INDURATED - hardened by pressure or cementation
GLAUCONITIC - containing a green mineral commonly occuring in soils of marine origin
FRIABLE - easily crumbled
HOMOGENEOUS - having the same color and appearance throughout
WELL GRADED - having wide range in grain sizes and substantial amounts of all intermediate particle sizes
POORLY GRADED - predominantly of one grain size, or having a range of sizes with some intermediate size missing
BLOCKY - having a structure that can be broken down into small angular lumps which resist further breakdown
ORGANIC - containing remains of living organisms
LAYER - a soil deposit with a thickness of about six inches
SEAM - a bed of soil less than six inches thick deposited within another soil mass
PARTING - a very small thickness of soil within another soil

NOTES

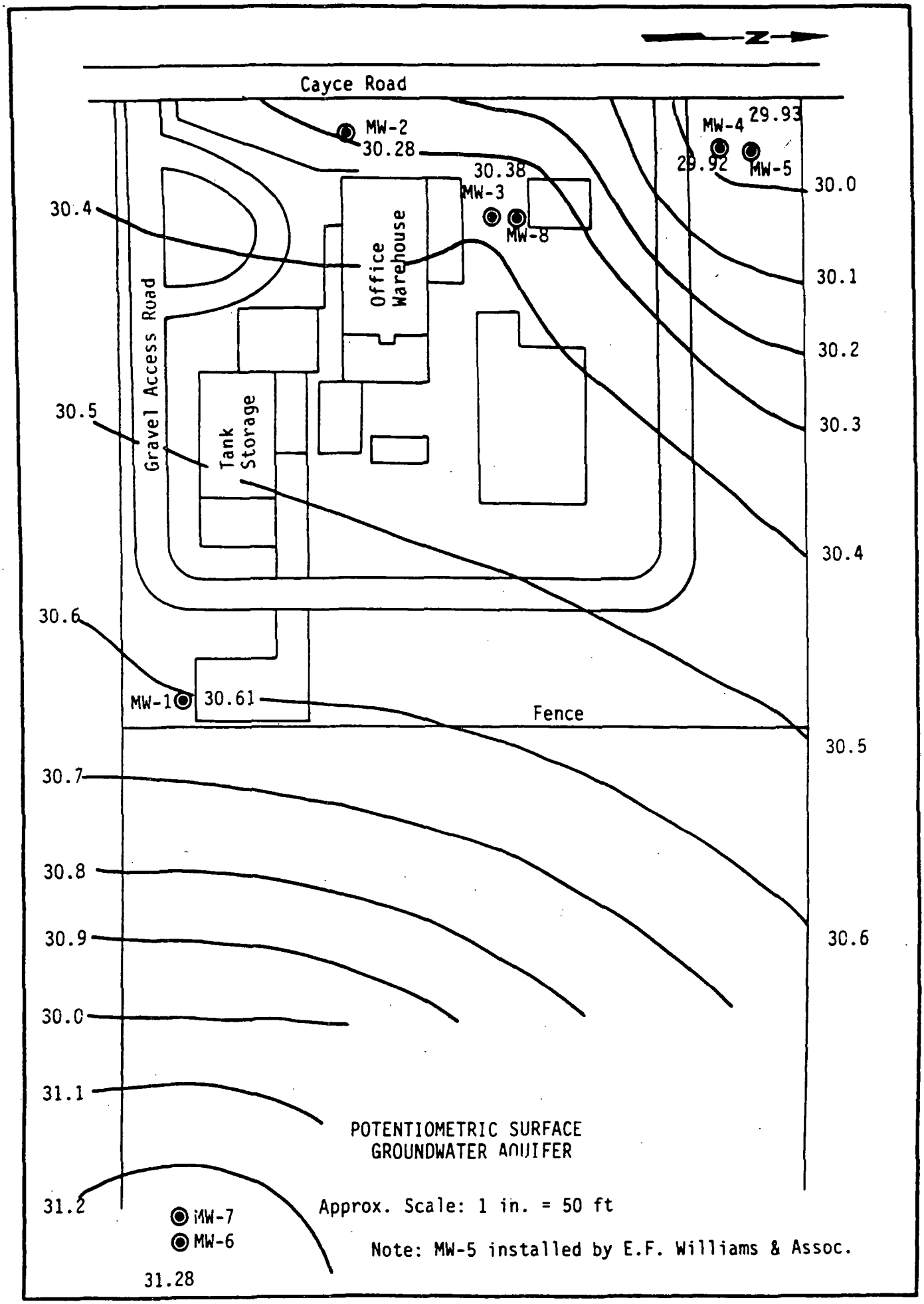
(1) Soil classification methods are in general agreement with ASTM Standard Test Methods D2487 and D2488. Wherever possible, classifications are based on laboratory test results. Where laboratory testing is insufficient to completely describe soil conditions, visual identifications are provided.

(2) Groundwater information is presented when available. The presence of initial free water is masked in borings advanced by rotary wash methods. Drilling fluid levels indicated might not reflect static groundwater conditions. Groundwater level fluctuations with rainfall and other seasonal factors will occur.

Table of Elevations

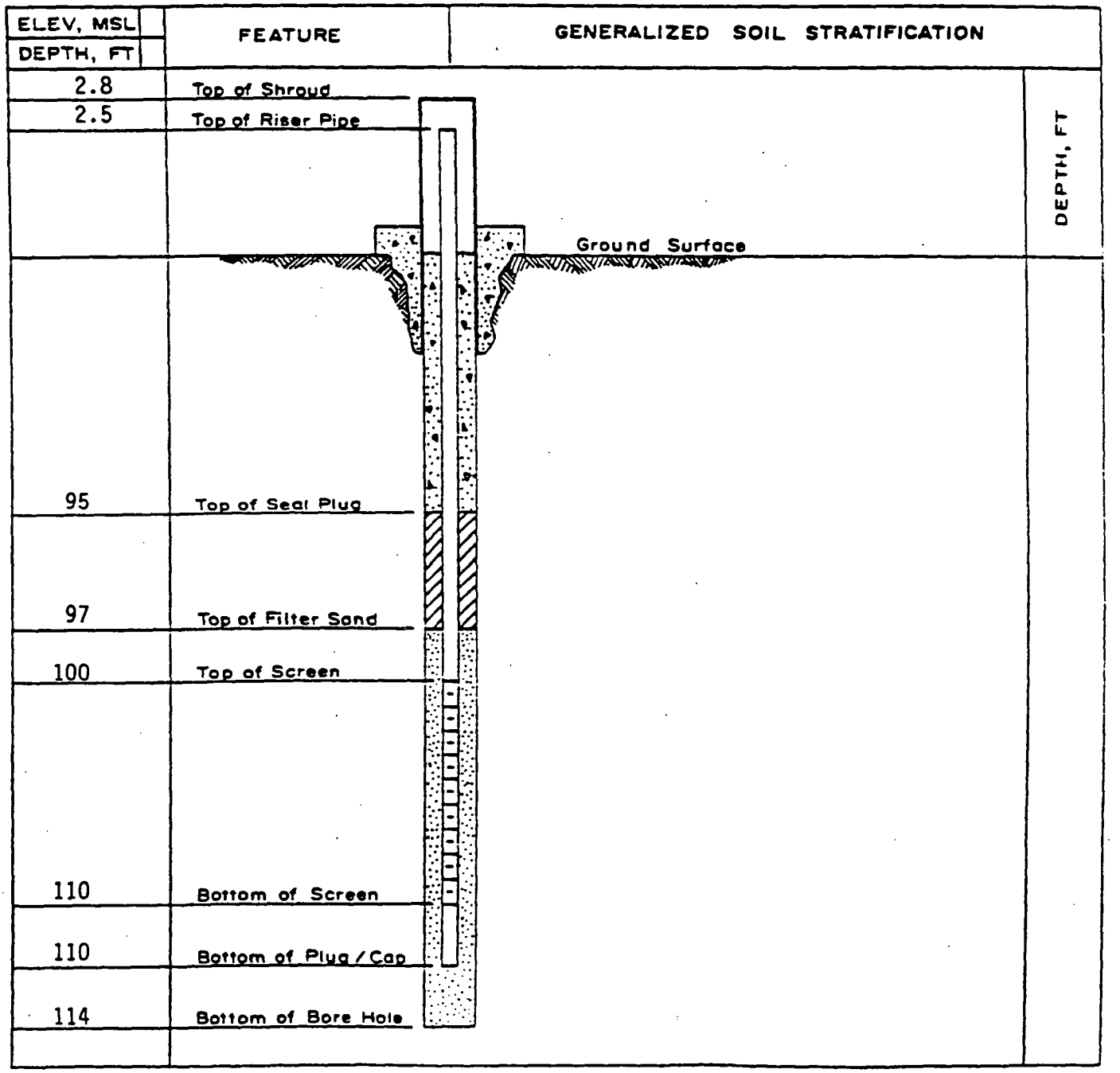
Monitor Well	TOC	Water Level (4/10/92)	Water Elevation
1	102.70	71.71	30.61
2	102.37	72.09	30.28
3	101.38	71.00	30.38
4	99.52	69.60	29.92
5	97.82	67.89	29.93
6	103.04	71.76	31.28
7	103.81	*	
8	101.02	*	

* MW-7 and MW-8 were developed and sampled on 4/10/92.


N
Cayce Road
MW-2
30.28
MW-4
29.93
29.92
MW-5
30.38
MW-3
MW-8
30.0
30.4
30.1
Office Warehouse
30.2
Gravel Access Road
30.5
30.3
Tank Storage
30.4
30.6
MW-1
30.61
Fence
30.5
30.7
30.8
30.6
30.9
30.0
31.1
POTENTIOMETRIC SURFACE
GROUNDWATER AQUIFER
31.2
MW-7
MW-6
Approx. Scale: 1 in. = 50 ft
Note: MW-5 installed by E.F. Williams & Assoc.
31.28

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Enterprise Recovery Services Facility Byhalia, Mississippi
Client Mississippi Department of Environmental Quality Date of Report 4/13/92
Observation Well No. MW-1 (B-1) Date Completed 3/4/92 Technician Tarbutton
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size .010 Diameter 2 in. Length 10 ft
Diameter of Borehole 6 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite Pellets Backfill Above Seal Grout
Drilling Mud Yes used. Fresh Water Flush Before Setting Well Screen Yes
Well Developed by Air Lift Method Development Time 1 hrs
Groundwater Level @ 2 hrs _____ @ 24 hrs _____ Other 71.70 4/6/92

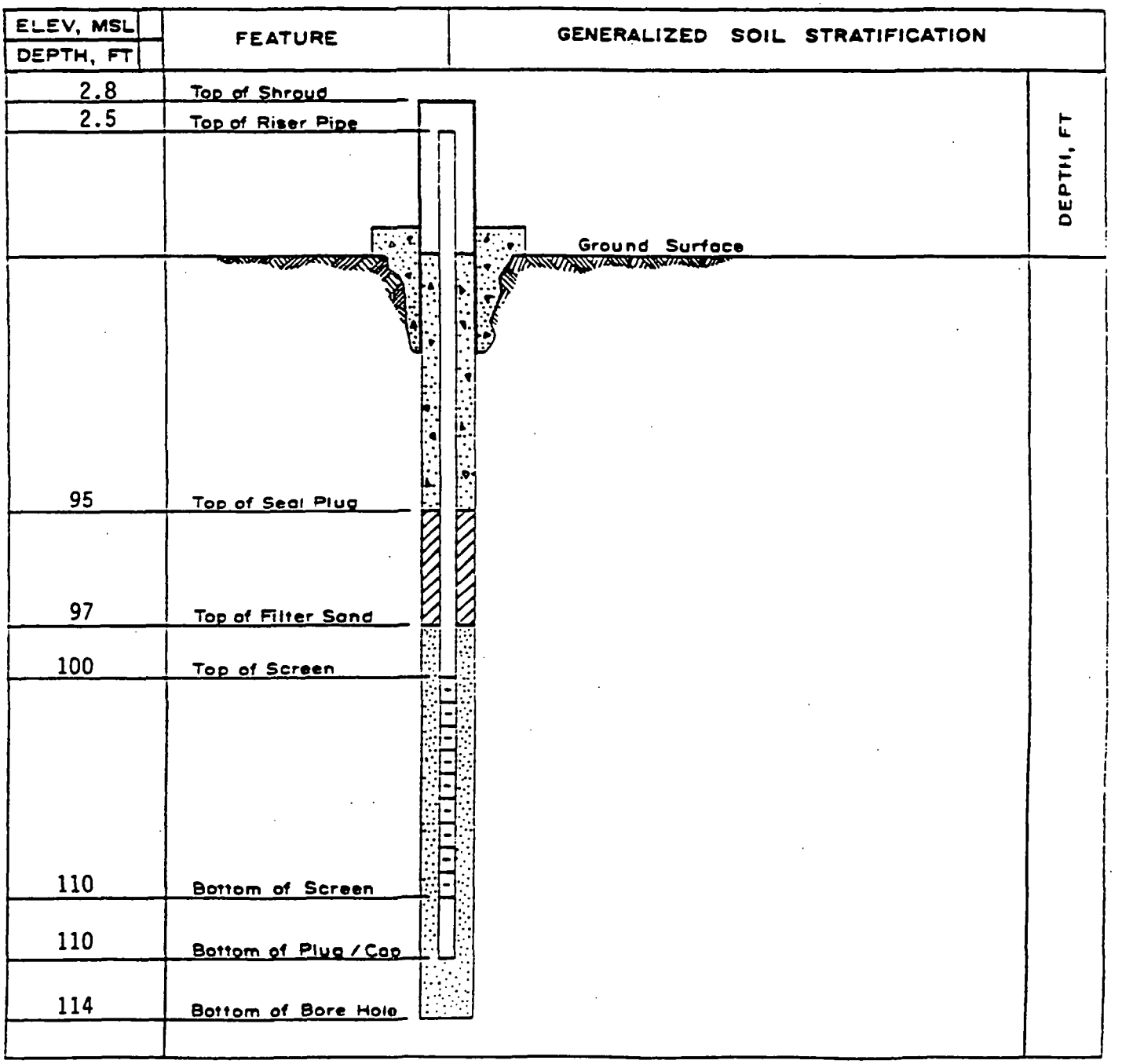


WARE LIND FURLOW ENGINEERS

PLATE 24

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Enterprise Recovery Services Facility Byhalia, Mississippi
Client Mississippi Department of Environmental Quality Date of Report 4/13/92
Observation Well No. MW-2 (B-2) Date Completed 3/7/92 Technician Tarbutton
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size .010 Diameter 2 in. Length 10 ft
Diameter of Borehole 6 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite Pellets Backfill Above Seal Grout
Drilling Mud Yes used. Fresh Water Flush Before Setting Well Screen Yes
Well Developed by Air Lift Method Development Time 1 hrs
Groundwater Level @ 2 hrs _____ @ 24 hrs _____ Other 72.09 4/6/92

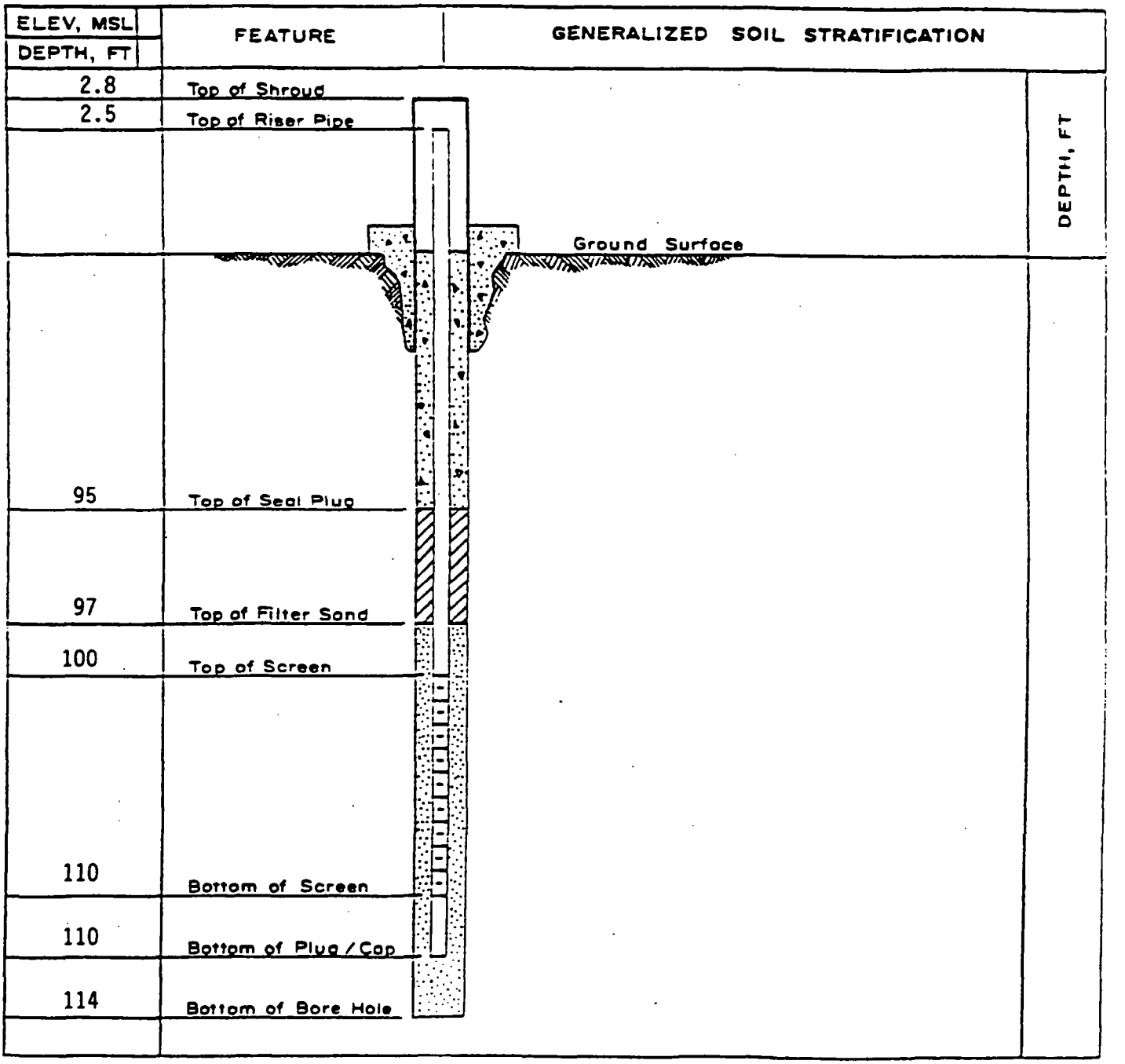


WARE LIND FURLOW ENGINEERS

PLATE 25

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Enterprise Recovery Services Facility Byhalia, Mississippi
Client Mississippi Department of Environmental Quality Date of Report 4/13/92
Observation Well No. MW-3 (B-3) Date Completed 3/7/92 Technician Tarbutton
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size .010 Diameter 2 in. Length 10 ft
Diameter of Borehole 6 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite Pellets Backfill Above Seal Grout
Drilling Mud Yes used. Fresh Water Flush Before Setting Well Screen Yes
Well Developed by Air Lift Method Development Time 1 hrs
Groundwater Level @ 2 hrs _____ @ 24 hrs _____ Other 70.98 4/6/92

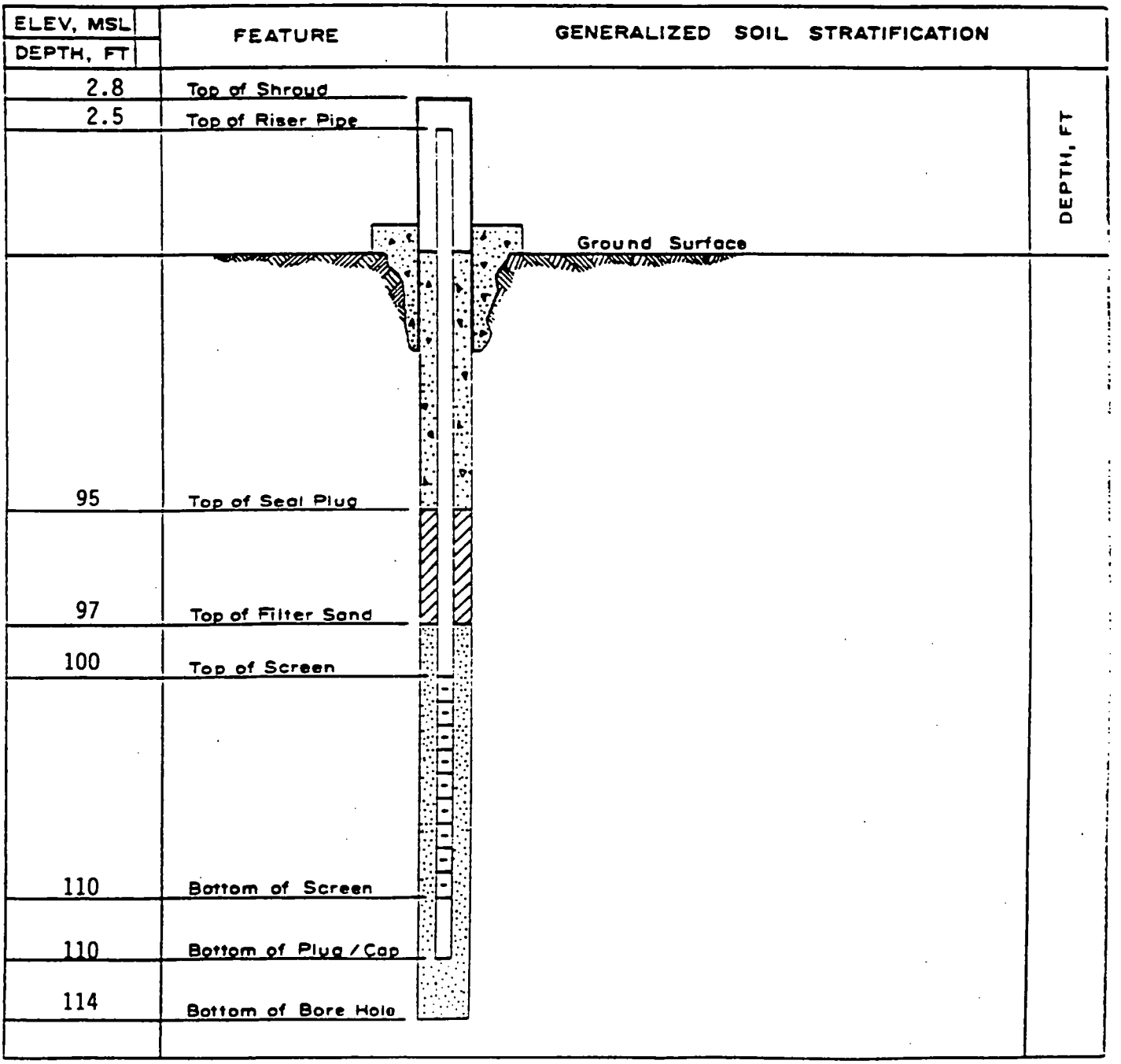


WARE LIND FURLOW ENGINEERS

PLATE 26

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Enterprise Recovery Services Facility Byhalia, Mississippi
Client Mississippi Department of Environmental Quality Date of Report 4/13/92
Observation Well No. MW-4 (B-4) Date Completed 3/9/92 Technician Tarbutton
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size .010 Diameter 2 in. Length 10 ft
Diameter of Borehole 6 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite Pellets Backfill Above Seal Grout
Drilling Mud Yes used. Fresh Water Flush Before Setting Well Screen Yes
Well Developed by Air Lift Method Development Time 1 hrs
Groundwater Level @ 2 hrs _____ @ 24 hrs _____ Other 69.56 4/6/92

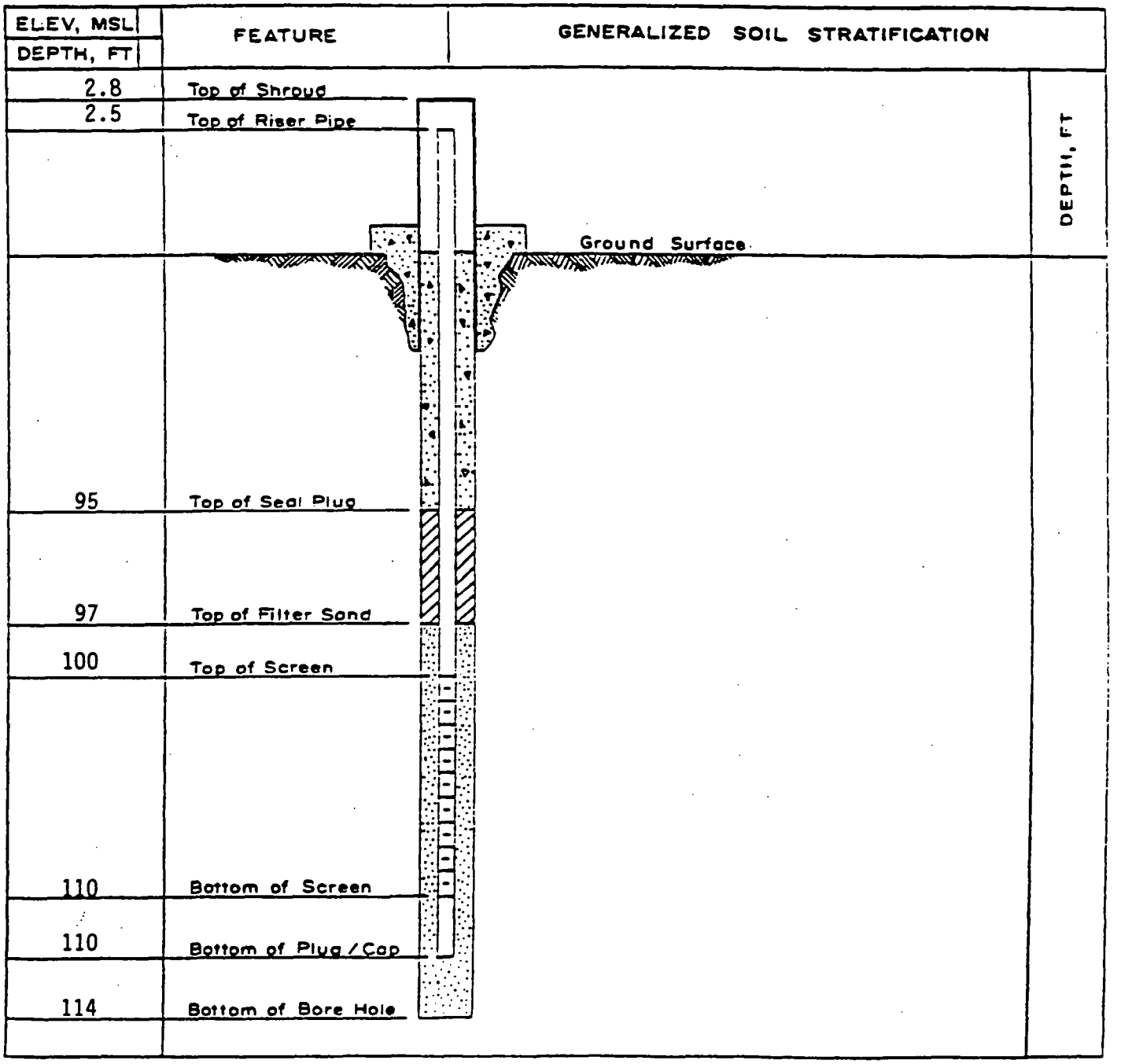


WARE LIND FURLOW ENGINEERS

PLATE 27

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Enterprise Recovery Services Facility Byhalia, Mississippi
Client Mississippi Department of Environmental Quality Date of Report 4/13/92
Observation Well No. MW-6 (B-5) Date Completed 4/8/92 Technician Tarbutton
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size .010 Diameter 2 in. Length 10 ft
Diameter of Borehole 6 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite Pellets Backfill Above Seal Grout
Drilling Mud Yes used. Fresh Water Flush Before Setting Well Screen Yes
Well Developed by Air Lift Method Development Time 1 hrs
Groundwater Level @ 2 hrs _____ @ 24 hrs _____ Other 71.76 4/10/92

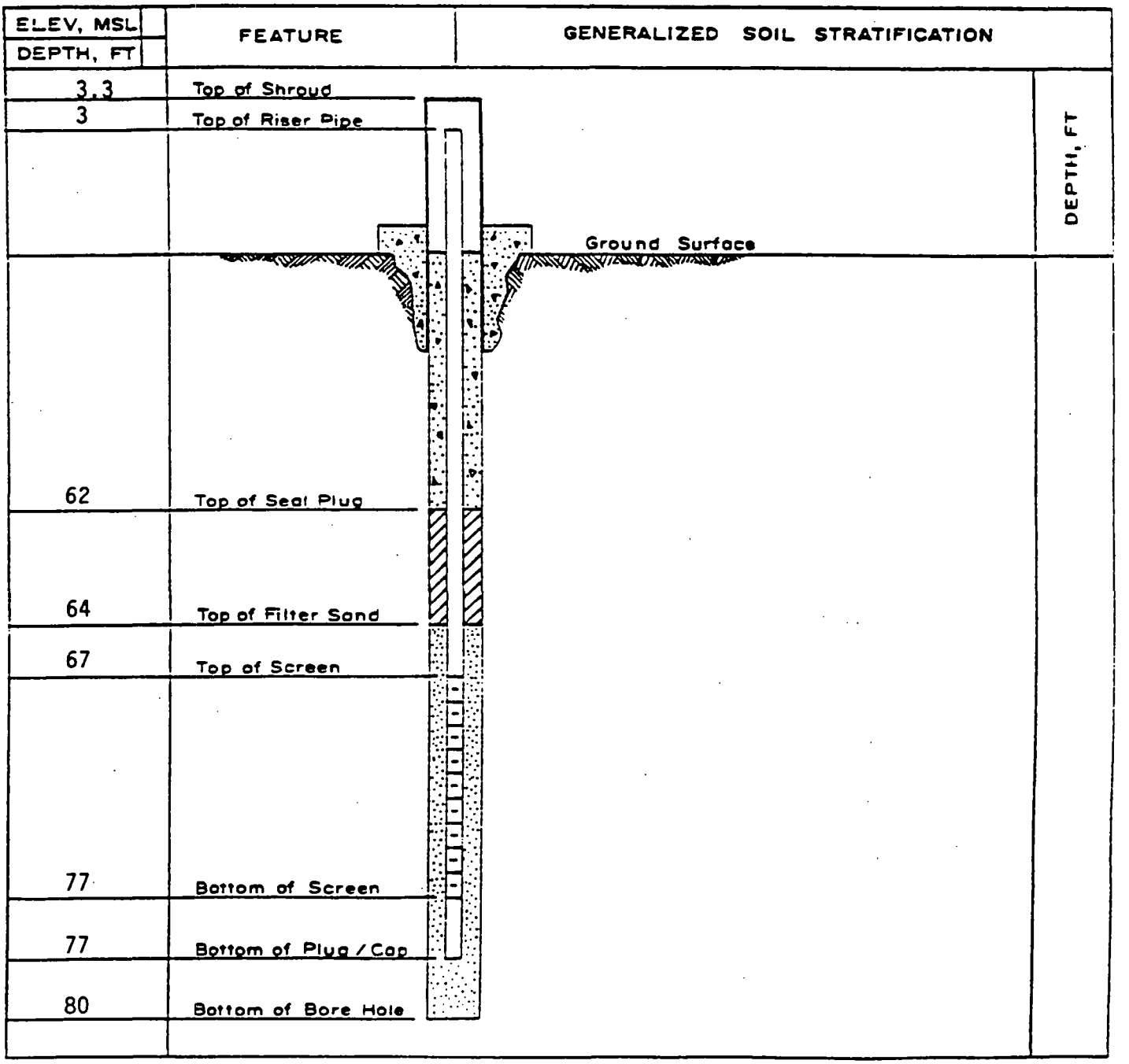


BARE LIND FURLOW ENGINEERS

PLATE 28

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Enterprise Recovery Services Facility Byhalia, Mississippi
Client Mississippi Department of Environmental Quality Date of Report 4/13/92
Observation Well No. MW-8 (B-7) Date Completed 4/9/92 Technician Tarbutton
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size .010 Diameter 2 in. Length 10 ft
Diameter of Borehole 6 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite Pellets Backfill Above Seal Grout
Drilling Mud Yes used. Fresh Water Flush Before Setting Well Screen Yes
Well Developed by Air Lift Method Development Time 1 hrs
Groundwater Level @ 2 hrs _____ @ 24 hrs _____ Other _____

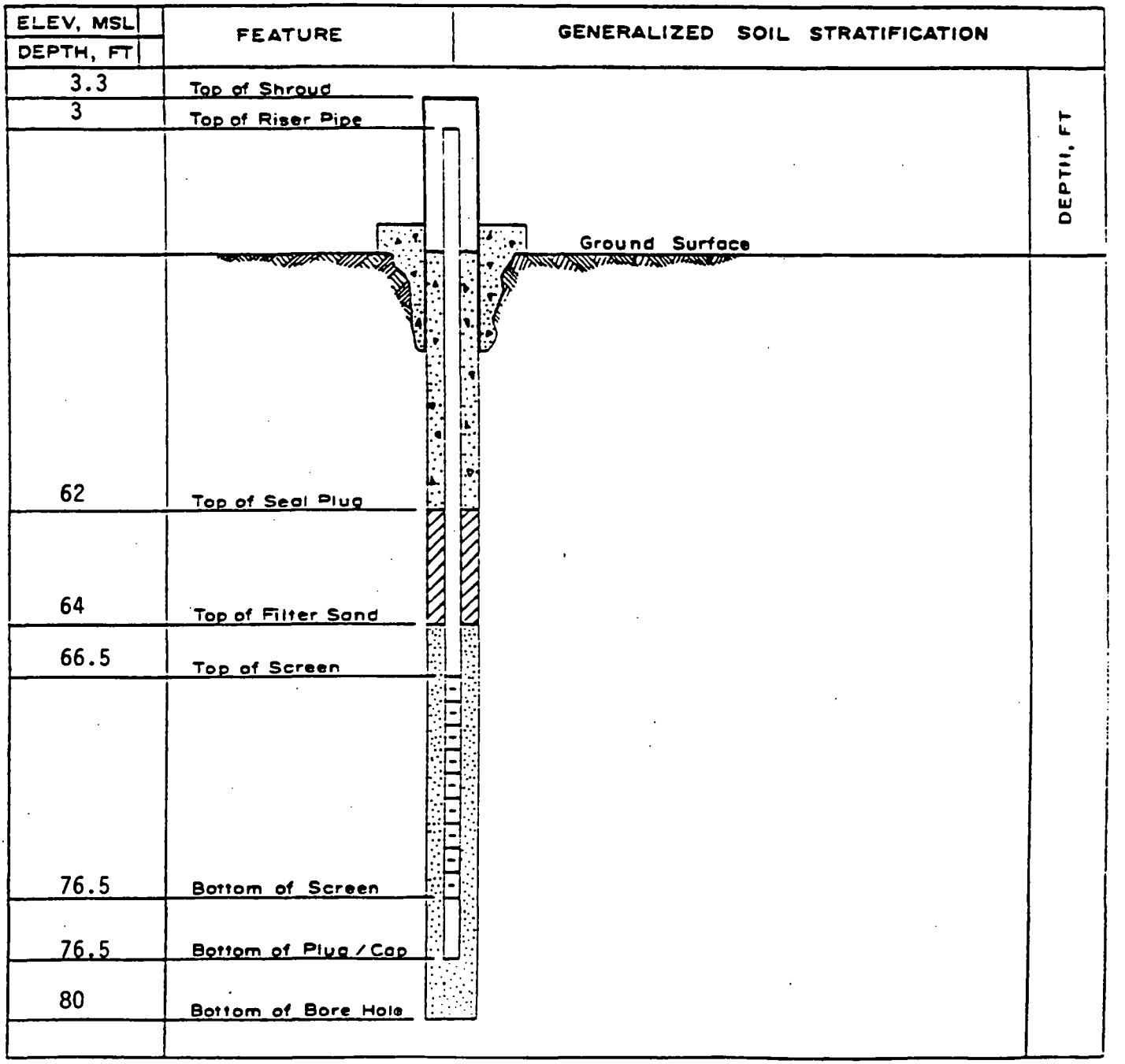


WARE LIND FURLOW ENGINEERS

PLATE 29

LOG OF GROUNDWATER OBSERVATION WELL

Project & Location Enterprise Recovery Services Facility Byhalia, Mississippi
Client Mississippi Department of Environmental Quality Date of Report 4/13/92
Observation Well No. MW-7 (B-6) Date Completed 4/8/92 Technician Tarbutton
Riser Pipe: Material PVC Diameter 2 in. Type of Joints Threaded
Screen: Material PVC Slot Size .010 Diameter 2 in. Length 10 ft
Diameter of Borehole 6 in. Type of Filter Pack No. 3 Blasting Sand
Method of Placement of Filter Material Tremie
Type of Seal Above Screen Bentonite Pellets Backfill Above Seal Grout
Drilling Mud Yes used. Fresh Water Flush Before Setting Well Screen Yes
Well Developed by Air Lift Method Development Time 1 hrs
Groundwater Level @ 2 hrs _____ @ 24 hrs _____ Other _____



WARE LIND FURLOW ENGINEERS

PLATE 30

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
Bureau of Land and Water Resources

P. O. Box 10631
Jackson, MS 39289-0631
WATER WELL DRILLERS LOG

COUNTY WELL LOCATED	
Marshall	
WELL NUMBER	CODED
MW-1	
DATE WELL COMPLETED	
3/14/12	

PERMIT NUMBER

NAME OF DRILLING FIRM
White Wilson Furlow Engineers LLC

NAME & MAILING ADDRESS OF LANDOWNER
Bob Thompson, C&R Products
Rt. 5 Box 287
Byhalia, MS 38611

WELL LOCATION: SEC NW1/4 27 TOWNSHIP 1 N(S) RANGE 4 E(W)

DISTANCE _____ Miles DIRECTION _____ of NEAREST TOWN _____

OTHER LANDMARK

WELL PURPOSE: Home, Irrigation, Municipal, Industrial, Fish Pond, etc.
Monitor Well

PUMP DATA

PUMP TYPE (Circle One): N/A
Submersible. Turbine. Jet Flowing Well.
Other (Describe) _____

POWER TYPE (Circle One):
Electric. Tractor. Diesel. Gasoline. Butane.
Other (Describe) _____ H/P _____

Pump Capacity (GPM)	No. of Stages	Setting Depth
		FT.

PUMP TEST N/A

Well yielded _____ GPM with

a drawdown of _____ ft.

after _____ hours of pumping

WELL DATA

Well Depth	Casing Diameter (In.)	Casing Length (Ft.)
110	2	100
Type of Casing	**Hole Depth**	**Depth to Static Water Level**
PVC	114	71.70

TYPE OF COMPLETION: (Circle One or More):
Gravel Packed. Underreamed. Telescoped.
Natural Development. Open Hole. Other
(Describe) Sand Pack

Top of Lap Pipe or Reduction in Casing
FEET

IF TELESCOPED OR MORE THAN ONE SCREEN: USE BACK PAGE

SCREEN DATA

Diameter - Inches	Length - Feet	Slot Size - Inches
2	10	.01
Screen Type		**Depth to Bottom - Feet**
PVC		110

LOG DATA

TYPE OF LOG RUN (Circle One): No Log Run.
Electric. Gamma Ray. Density. Sonic. Neutron.
Other (Describe) _____

Name of Organization Running Log

GEOLOGIC DATA (Office Use Only)

Surface Elev.	Geologic Unit	Unit Thickness	Depth to Top
Subs. SWL	Date	Analysis	Aquifer Test

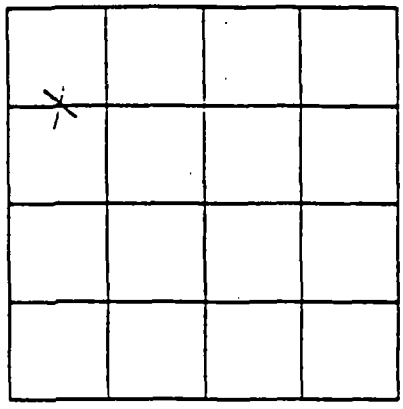
Driller's Remarks

DESCRIPTION OF FORMATIONS ENCOUNTERED	FROM	TO
Firm light gray silty clay	0	16.5
- Stiff blocky 6'		
- Silty sand bel 13'		
Medium dense tan fine to	16.5	110
medium sand occasional		
clay layers		
- Silty below 43'		

FORMATIONS (Continued)	FROM	TO
IF MORE SPACE IS NEEDED, USE BACK		

If well telescopes please sketch and show depths.

GROUND LEVEL



SECTION 27

Please indicate well location X.

ADDITIONAL INFORMATION

MW's 2, 3, 4, and 6 to 110' as MW 1 in accordance with MDEQ board and water regulations.

If more than one screen, show location of each on sketch.

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
Bureau of Land and Water Resources
P. O. Box 10631
Jackson, MS 39289-0631
WATER WELL DRILLERS LOG

COUNTY WELL LOCATED: Marshall
WELL NUMBER: MW-7
CODED:
DATE WELL COMPLETED:

PERMIT NUMBER: O-465
NAME OF DRILLING FIRM: Ware Lind Furlow Engineers Inc

NAME & MAILING ADDRESS OF LANDOWNER:
Bob Thompson, C&R Products
Rt. 5, Box 287
Byhalia, Mis 38611

WELL LOCATION: NW/4 SEC 27 TOWNSHIP 1 N/S (S) RANGE 4 E/W (W)

DISTANCE ______ Miles DIRECTION ______ of NEAREST TOWN ______

OTHER LANDMARK:

WELL PURPOSE (Home, Irrigation, Municipal, Industrial, Fish Pond, etc.): Monitor Well

PUMP DATA

PUMP TYPE (Circle One): N/A
Submersible. Turbine. Jet Flowing Well.
Other (Describe) ______
POWER TYPE (Circle One):
Electric. Tractor. Diesel. Gasoline. Butane.
Other (Describe) ______ H/P ______

Pump Capacity (GPM)	No. of Stages	Setting Depth
		FT.

PUMP TEST
Well yielded ______ GPM with a drawdown of ______ ft. after ______ hours of pumping

WELL DATA

Well Depth	Casing Diameter (in.)	Casing Length (Ft.)
77	2	67

Type of Casing	Hole Depth	Depth to Static Water Level
PVC	80	

TYPE OF COMPLETION: (Circle One or More):
Gravel Packed. Underreamed. Telescoped. Natural Development. Open Hole. Other (Describe) Sand Pack

Top of Lap Pipe or Reduction in Casing ______ FEET
IF TELESCOPED OR MORE THAN ONE SCREEN: USE BACK PAGE

LOG DATA

TYPE OF LOG RUN (Circle One): (No Log Run)
Electric. Gamma Ray. Density. Sonic. Neutron.
Other (Describe) ______

Name of Organization Running Log:

GEOLOGIC DATA (Office Use Only)

Surface Elev.	Geologic Unit	Unit Thickness	Depth to Top
Supp. SWL	**Date**	**Analyses**	**Aquifer Test**

Driller's Remarks:

SCREEN DATA

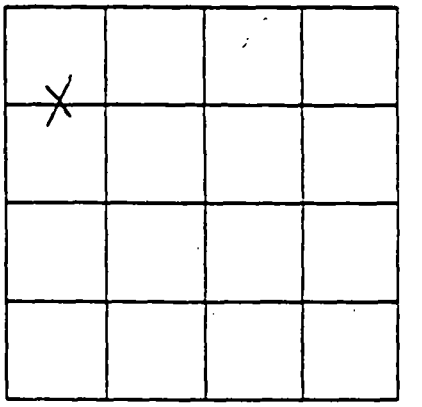
Diameter - Inches	Length - Feet	Slot Size - Inches
2	10	.01

Screen Type	Depth to Bottom - Feet
PVC	77

DESCRIPTION OF FORMATIONS ENCOUNTERED	FROM	TO	FORMATIONS (Continued)	FROM	TO
Stiff Tan and Light Gray silty	0	12			
Clay					
Medium dense Tan to red	12	80			
vf to medium Sand, silty					
			IF MORE SPACE IS NEEDED, USE BACK		

If well telescopes please sketch and show depths.

GROUND LEVEL



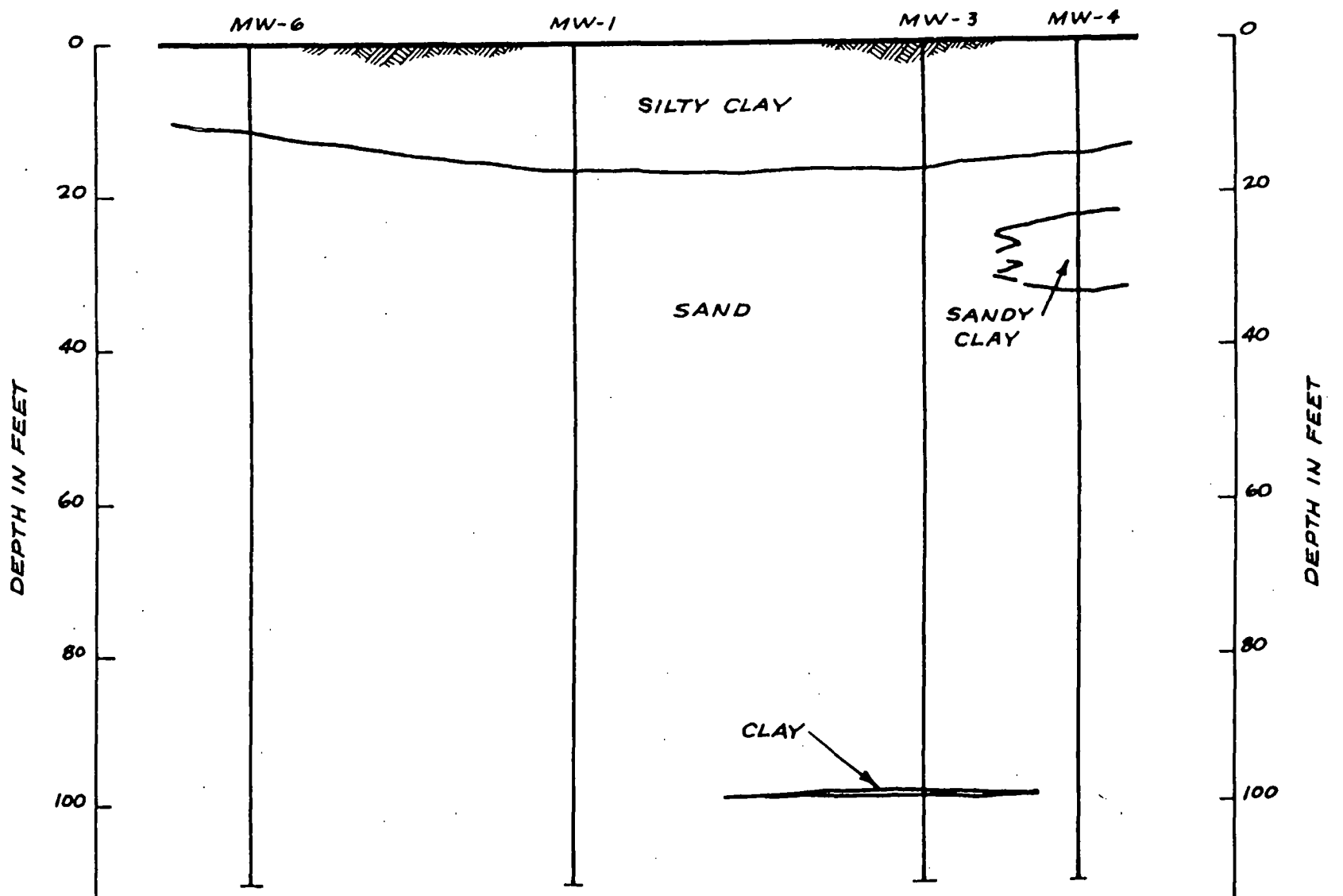
SECTION 27

Please indicate well location X.

ADDITIONAL INFORMATION

MW3 is additional to MW1 completed to 76.5'. Monitor wells were installed in accordance with DNREC hazardous water regulations

If more than one screen, show location of each on sketch.



GENERALIZED SOILS PROFILE

Horizontal Scale: 1 in. = 100 ft
Vertical Scale: 1 in. = 20 ft

APPENDIX

MISSISSIPPI DEPARTMENT
OF ENVIRONMENTAL QUALITY

CHAIN OF CUSTODY RECORD

OFFICE OF
POLLUTION CONTROL
P. O. Box 10385
Jackson, Mississippi 39289-0385

MSD

PROJECT LEADER: Ron Farbuttion

PROJECT NAME/LOCATION: Marshall County - DEQ

REMARKS

DATA TO:

ESD SAMPLE TYPES
1. SURFACE WATER 6. SOIL/SEDIMENT
2. GROUND WATER 7. SLUDGE
3. POTABLE WATER 8. WASTE
4. WASTEWATER 9. AIR
5. LEACHATE 10. FISH
11. OTHER

SAMPLER: James G Brown

STATION NO.	SAMPLE TYPE	1992 DATE	TIME	COMP	GRAB	STATION LOCATION/DESCRIPTION	TOTAL CONTAINERS	CIRCLE/ADD parameters desired. List no. of containers submitted. ANALYSIS: VOA	Semi Volatile Org. Comp.	Pest/PCBs	METALS	CYANIDE	TAG NO./REMARKS	Custody Seals Intact at Lab	Seals Not Intact Upon Rec'd by Lab	LAB USE ONLY
City WTR		4/3/92	1210		✓	City of Collinsville WTK Supply	4	X								
City WTR						Trip Blank for City WTK	1	X								

RELINQUISHED BY: (PRINT)	(SIGN)	DATE/TIME	RECEIVED BY: (PRINT)	(SIGN)	RELINQUISHED BY: (PRINT)	(SIGN)	DATE/TIME	RECEIVED BY: (PRINT)	(SIGN)
James G Brown	James G Brown	4/7/1430	Jammie Malone	Jammie Malone					
RELINQUISHED BY: (PRINT)	(SIGN)	DATE/TIME	RECEIVED BY: (PRINT)	(SIGN)	RELINQUISHED BY: (PRINT)	(SIGN)	DATE/TIME	RECEIVED BY: (PRINT)	(SIGN)

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8/90

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

CHAIN OF CUSTODY RECORD

OFFICE OF POLLUTION CONTROL
P. O. Box 10385
Jackson, Mississippi 39289-0385

MSD

PROJECT LEADER: Ron Ta-Button

PROJECT NAME/LOCATION: Marshall County - DEQ

ESD SAMPLE TYPES:
1. SURFACE WATER
2. GROUND WATER
3. POTABLE WATER
4. WASTEWATER
5. LEACHATE
6. SOIL/SEDIMENT
7. SLUDGE
8. WASTE
9. AIR
10. FISH
11. OTHER

SAMPLER: James W. Brown

REMARKS

DATA TO:

CIRCLE/ADD parameters desired. List no. of containers submitted.

STATION NO.	SAMPLE TYPE	DATE (1992)	TIME	COMP	GRAB	STATION LOCATION/DESCRIPTION	TOTAL CONTAINERS	VOA	Semi volatile org. (ABN)	Pest/PCBs	METALS	CYANIDE				TAG NO./REMARKS	Custody Seals Intact at Lab	Seals Not Intact Upon Receipt by Lab	LAB USE ONLY
MW-7	2	4/10	1105		X		4	X											
MW-6	2	4/10	1115		X		4	X											
MW-5	2	4/10	1130		X		4	X											
MW-7						BLANK	1	X											
MW-6						BLANK	1	X											
MW-5						BLANK	1	X											

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
(PRINT) James W. Brown (SIGN) James W. Brown	4/10 1535	(PRINT) Jimmie Malone (SIGN) Jimmie Malone	(PRINT) (SIGN)		(PRINT) (SIGN)
RELINQUISHED BY: (PRINT) (SIGN)	DATE/TIME	RECEIVED BY: (PRINT) (SIGN)	RELINQUISHED BY: (PRINT) (SIGN)	DATE/TIME	RECEIVED BY: (PRINT) (SIGN)

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MISSISSIPPI DEPARTMENT
OF ENVIRONMENTAL QUALITY

CHAIN OF CUSTODY RECORD

OFFICE OF
POLLUTION CONTROL
P. O. Box 10385
Jackson, Mississippi 39289-0385

MSD

PROJECT LEADER: Ken Turbuttin

PROJECT NAME/LOCATION: Marshall County

REMARKS

DATA TO:

ESD SAMPLE TYPES
1. SURFACE WATER
2. GROUND WATER
3. POTABLE WATER
4. WASTEWATER
5. LEACHATE
6. SOIL/SEDIMENT
7. SLUDGE
8. WASTE
9. AIR
10. FISH
11. OTHER

SAMPLER: James W Brown

CIRCLE/ADD parameters desired. List no. of containers submitted.

ANALYSIS: VOA, Semivolatile org. compds, Pest/PCBs, METALS, CYANIDE

STATION NO	SAMPLE TYPE	DATE (1992)	TIME	COMP	GRAB	STATION LOCATION/DESCRIPTION	TOTAL CONTAINERS	VOA	Semivolatile org. compds	Pest/PCBs	METALS	CYANIDE				TAG NO./REMARKS	Custody Seals Intact at Lab	Seals Not Intact Upon Rec'pt by Lab	LAB USE ONLY
MW-2	2	4/6	1730		X		4	X											
MW-4	2	4/6	1750		X		4	X											
MW-1	2	4/6	1900		X		4	X											
MW-3	2	4/7	1000		X		4	X											
MW-5	2	4/7	1010		X		4	X											
MW-2						Blank	1	X											
MW-4						Blank	1	X											
MW-1						Blank	1	X											
MW-3						Blank	1	X											
MW-5						Blank	1	X											
Rinse	3	4/7/92	1145	X		Equipment [illegible]	4	X											
Rinse						Rinsate Blank	1	X											

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
(PRINT) James W Brown (SIGN) James W Brown	4/7 1620	(PRINT) Sammie Malone (SIGN) Sammie Malone	(PRINT) (SIGN)		(PRINT) (SIGN)
RELINQUISHED BY: (PRINT) (SIGN)	DATE/TIME	RECEIVED BY: (PRINT) (SIGN)	RELINQUISHED BY: (PRINT) (SIGN)	DATE/TIME	RECEIVED BY: (PRINT) (SIGN)

DISTRIBUTION: White and Yellow copies accompany sample shipment to laboratory; Yellow copy retained by laboratory. White copy is returned to samplers; Pink copy retained by samplers.

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